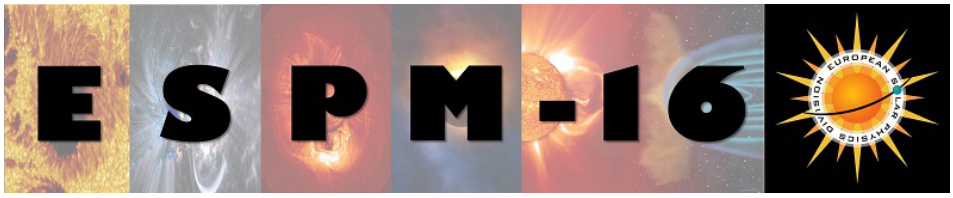

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Modelling Solar Ca II H & K Emission Variations

Tuesday, 7 September 2021 09:52 (13 minutes)

The emission in the near ultraviolet Ca II H & K lines, often quantified via the S-index, has been serving as a prime proxy of solar and stellar magnetic activity. Despite the broad usage of the S-index, the link between coverage of a stellar disk by magnetic features and Ca II H & K emission is not fully understood. In order to fill this gap we developed a physics-based model to calculate the solar S-index. To this end, we used the distributions of the solar magnetic features derived from simulations of magnetic flux emergence and surface transport, together with the Ca II H & K spectra synthesised using a non-LTE radiative transfer code.

We show that the solar S-index value is influenced by the inclination angle between the solar rotation axis and the observer's line-of-sight, i.e. the solar S-index values obtained by an out-of-ecliptic observer are different from those obtained by an ecliptic-bound observer. This is important for comparing the magnetic activity of the Sun to other stars. We computed time series of the S-index as they would be observed at various inclinations dating back to 1700. We find that depending on the inclination and period of observations, the activity cycle in solar S-index can appear weaker or stronger than in stars with a solar-like level of magnetic activity. We show that there is nothing unusual about the solar chromospheric emission variations in the context of stars with near-solar magnetic activity.

Student poster?

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